



KNJ-214-A

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Patentee: Ikeda et al.  
Serial Number: 10/562,336  
Received At Patent Office On: 23 December 2005  
International Application: PCT/JP2004/008621 filed 18 June 2004  
U.S. National Phase Filing Completion  
Date Under 35 USC §371: 23 December 2005  
Patent Number: 7,529,445  
Issued: 05 May 2009  
Group Art Unit: 2885  
Examiner: J. A. Ward  
Confirmation Number: 3612  
Title: Light Guide And Image Reader

**Certificate**  
**OCT 22 2009**  
**of Correction**

**REQUEST FOR ISSUANCE OF A CERTIFICATE OF CORRECTION**  
**OF APPLICANT'S MISTAKE UNDER 37CFR§1.323**  
**AND OF PATENT OFFICE MISTAKE UNDER 37CFR§1.322**

Attention Certificate Of Corrections Branch  
Commissioner For Patents  
Post Office Box 1450  
Alexandria, Virginia 22313-1450

Sir:

In connection with the identified patent, Patentee respectfully requests issuance of a Certificate Of Correction as enclosed herewith in duplicate.

In proofreading the patent, mistakes were found which were due to Patent Office and Applicant error. Accordingly, also enclosed herewith is a Credit Card Payment Form PTO-2038 authorizing the Commissioner to charge the \$100.00 fee, as required by 37CFR§1.20(a), to the credit card specified thereon.

Included herein, Patentee requests correction of the patent title, as printed in the patent document, from "LIGHT GUIDE AND LINE ILLUMINATOR" to --**LIGHT GUIDE AND IMAGE READER**--, for these reasons:

(1) **LIGHT GUIDE AND IMAGE READER** is the title printed at the top of page 1 of the specification filed as the U.S. National Phase application (copy attached,

"Exhibit A");

(2) **LIGHT GUIDE AND IMAGE READER** is the title provided on the Application Data Sheet (copy of page 1 showing "Title Of Invention" attached, "Exhibit B") and all other papers filed by Applicant in the present application, both at the time of filing and during prosecution;

(3) **LIGHT GUIDE AND IMAGE READER** is the title printed on the pre-grant publication, US 2006/0159393 A1, published on 20 July 2006 (copy of title page attached, "Exhibit C");

(4) patented claims 1-6 and 11-17 cover the **LIGHT GUIDE** aspect of the **LIGHT GUIDE AND IMAGE READER** (copies of said claims attached, "Exhibit D"); and

(5) patented claims 7-10 cover the **IMAGE READER** aspect of the **LIGHT GUIDE AND IMAGE READER** (copies of said claims attached, "Exhibit E"); while

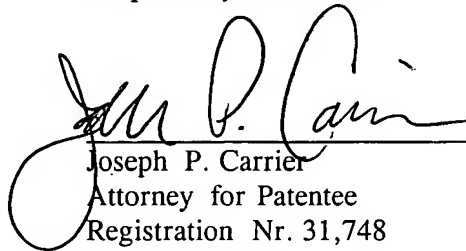
(6) conversely, "LIGHT GUIDE AND LINE ILLUMINATOR" first appeared on the filing receipt dated 13 April 2007.

Patentee believes these reasons constitute a sufficient basis for the Patent Office to grant Patentee's request for correction of the title.

Favorable consideration is respectfully requested.

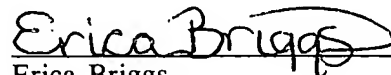
Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to Attention Certificate Of Corrections Branch, Commissioner For Patents, Post Office Box 1450, Alexandria, Virginia 22313-1450, with sufficient postage affixed thereto, on 16 October 2009.

Dated: 16 October 2009  
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\_\_\_\_\_  
Erica Briggs



KNJ-214-A

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10/562336

Specification

IAP17 Rec'd PCT/PTO 23 DEC 2005

**Light Guide and Image Reader**

**Technical Field**

[001] The present invention relates to a light guide for illuminating documents in a line shape in facsimile machines, copying machines, scanners and the like, and an image reader having this light guide incorporated therein.

**Background Art**

[002] There is proposed, for the purpose of effectively irradiating the object of irradiation with lights from light sources, what uses a light guide whose section is a paraboloid (see Patent Document 1 for instance).

[003] There is also known a compound parabolic concentrator (CPC) which is intended to enhance the efficiency of concentration with no regard for image formation performance (Non-Patent Document 1).

Patent Document 1: Japanese Patent Laid-Open No. 2001-330734

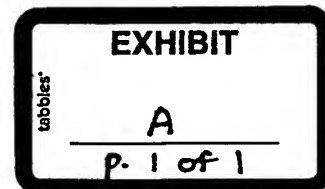
Non-Patent Document 1: Title of book – No. 6, Pencil of Light 5: Non-Image Forming Light Concentrating Optical System; Author – Tadao Tsuruta

**Disclosure of the Invention**

**Problems to be Solved by the Invention**

[004] Lights emitted from a light guide expand. As a result, where the distance between the document and the emitting face is great, the illumination of the face of the document may decline, which is not desirable.

[005] Incidentally, as stated in Non-Patent Document 1, a compound parabolic concentrator (CPC) is an optical system devised for efficient concentration of lights, and has a



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**IAP17 Rec'd PCT/PTO 23 DEC 2005**

*U. S. and Foreign Patents, Trademarks, Copyrights, Computer Law, Trade Secrets, Licensing, and Litigation*

**EXPRESS MAIL CERTIFICATE NO. EQ398010705US**

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PO Box 1450  
Alexandria VA 22313-1450

23 December 2005

**APPLICATION DATA SHEET  
INCLUDING BIBLIOGRAPHIC DATA, APPLICATION TRANSMITTAL,  
AND CERTIFICATE OF MAILING**

Sir:

Enclosed please find an application for entering the U.S. National Phase of the International Patent Application under 35 USC37, as identified below:

Title Of Invention: **Light Guide And Image Reader**

Application Type: 371 U.S. National Phase of International Patent  
Application PCT/JP2004/008621 filed 18 June 2004

Attorney Docket Number: **KNJ-214-A**

Correspondence  
Customer Number: 21828

Inventors:

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**EXHIBIT**

**B**

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US 20060159393A1

(19) United States

(12) Patent Application Publication

Ikeda

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(43) Pub. Date:

Jul. 20, 2006

(54) LIGHT GUIDE AND IMAGE READER

(52) U.S. Cl. .... 385/31; 385/146

(76) Inventor: Makoto Ikeda, Osaka (JP)

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NOVI, MI 48375

(21) Appl. No.: 10/562,336

(22) PCT Filed: Jun. 18, 2004

(86) PCT No.: PCT/JP04/08621

(30) Foreign Application Priority Data

Jun. 25, 2003 (JP) ..... 2003181626

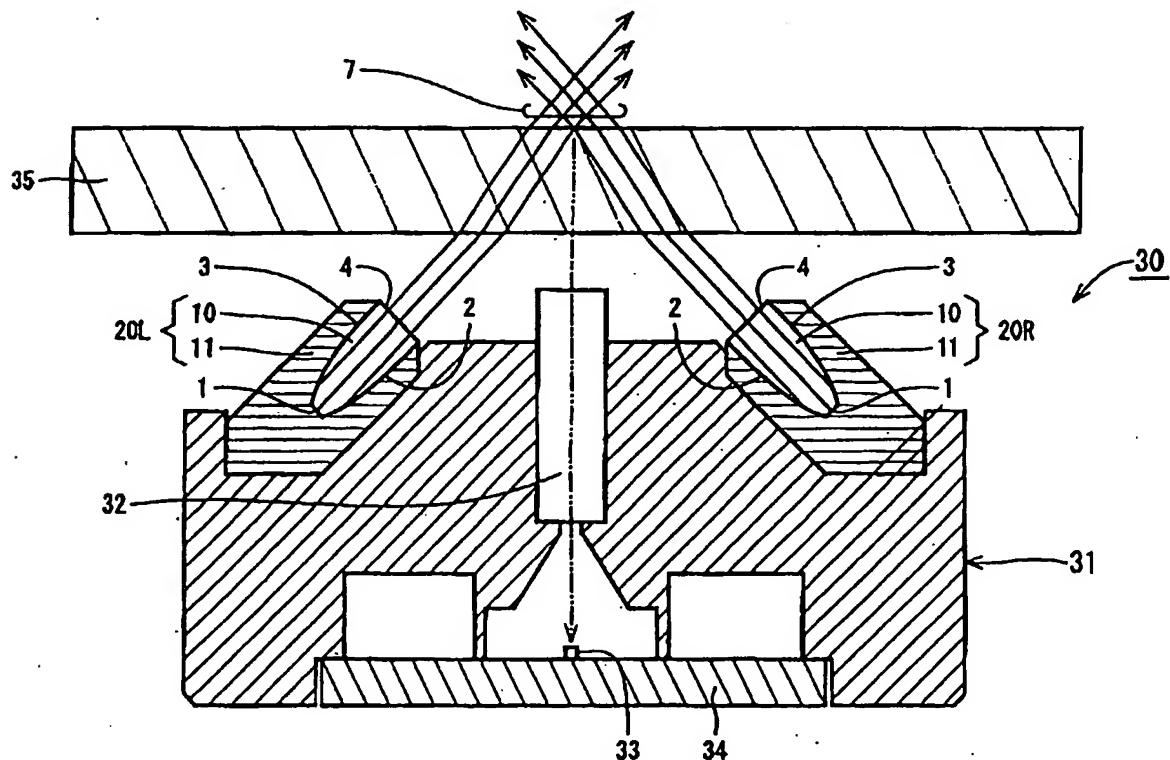
## Publication Classification

(51) Int. Cl.  
G02B 6/26 (2006.01)

(57) ABSTRACT

KNJ-214A

A light guide emits lights incident on an end face from an emitting face extending longitudinally of the guide, while having the lights reflected by its internal face. A sectional shape of the guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas, a line segment connecting the focal points of the two opposite parabolas, and a line segment (bottom face) corresponding to the emitting face. A scattering pattern consisting of white ink is formed on the line segment (bottom face) connecting the focal points. With this guide, the face of a document is to be efficiently illuminated by conversely utilizing the characteristic of the compound parabolic concentrator (CPC) to convert scattered lights extending over a full angle from a limited area into radiant lights confined to a prescribed emission angle and thereby minimizing the expansion of lights.



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numeral 66 denotes a plastic case. This line illuminator 60, as it has no reflective face in the refractive index medium, serves to restrain the angle of expansion. Thus, since the contents of the compound parabolic reflectors 63 and 64 are air, lights do not expand when they are emitted from the opening 65, which is the outlet of illuminating lights.

Although there have been described what are the present exemplary embodiments of the invention, it will be understood that variations and modifications may be made thereto within the spirit and scope of the appended claims.

The invention claimed is:

1. An elongate light guide having an end face on a longitudinal end thereof, an elongate emitting face extending longitudinally of the guide and an internal face extending longitudinally of the guide, the light guide emits lights incident on the end face from the emitting face in a line shape, while the lights are reflected by the internal face, wherein a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face.

2. The light guide according to claim 1, wherein a side face of the light guide on a side of said emitting face is substantially parallel to the optical axis.

3. The light guide according to claim 1, wherein the sectional shape of the light guide causes light emitted from the emitting face to be confined to a prescribed emission angle with respect to the emitting face.

4. The light guide according to claim 1, wherein the said line segment connecting the focal points corresponds to a bottom face of the light guide extending longitudinally thereof, is disposed opposite to said line segment corresponding to said emitting face, and has a scattering pattern formed thereon.

5. The light guide according to claim 1, wherein said end face is adapted to receive incident light thereon from a light source.

6. The light guide according to claim 1, wherein the line segment corresponding to said emitting face of the light guide has a larger width than that of the said line segment connecting the focal points.

7. An image reader comprising an illuminating unit including: an elongate light guide having an end face on a longitudinal end thereof, an elongate emitting face extending longitudinally of the guide and an internal face extending longitudinally of the guide, the light guide emits lights incident on the end face from the emitting face in a line shape, while the lights are reflected by the internal face, wherein a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face, a light source on an end face of the light guide, a lens array for converging on a light receiving element lights radiated from the illuminating unit toward a document and reflected by the document or transmitted by the document, and a box housing the illuminating unit and the lens array.

8. The image reader according to claim 7, including two of said illuminating units, and the illuminating units are so arranged as to cause lights emitted from the emitting faces of the light guides thereof to irradiate the same area of a face of the document being illuminated.

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9. An image reader comprising an illuminating unit including: an elongate light guide having an end face on a longitudinal end thereof, an elongate emitting face extending longitudinally of the guide and an internal face extending longitudinally of the guide, the light guide emits lights incident on the end face from the emitting face in a line shape, while the lights are reflected by the internal face, wherein a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face, and a light source on an end face of the light guide, a lens array for converging on a light receiving element lights radiated from the illuminating unit toward a document and reflected by the document or transmitted by the document, and a box housing the illuminating unit and the lens array, wherein a side face of the light guide on a side of said emitting face is substantially parallel to the optical axis.

10. The image reader according to claim 9, including two of said illuminating units, and the illuminating units are so arranged as to cause lights emitted from the emitting faces of the light guides thereof to irradiate the same area of a face of the document being illuminated.

11. An elongate light guide comprising:  
an end face;  
an emitting face extending longitudinally of the guide and which emits light in a line shape; and  
an internal face;  
wherein:  
the light guide emits light incident on the end face from the emitting face while the light is reflected by the internal face;  
the light emitted from the emitting face is confined to a prescribed emission angle with respect to the emitting face;  
a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face; and  
said line segment connecting the focal points is disposed opposite to said line segment corresponding to said emitting face and has a scattering pattern formed thereon.

12. The light guide according to claim 11, wherein a side face of the light guide on a side of said emitting face is substantially parallel to an optical axis of the light guide.

13. The light guide according to claim 11, wherein said end face is adapted to receive incident light thereon from a light source.

14. The light guide according to claim 11, wherein the line segment corresponding to said emitting face of the light guide has a larger width than that of the said line segment connecting the focal points.

15. An elongate light guide comprising:  
an end face;  
an emitting face extending longitudinally of the guide which emits light in a line shape; and  
an internal face;  
wherein:  
said end face is adapted to receive incident light thereon from a light source;

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the light guide emits the light incident on the end face from the emitting face while the light is reflected by the internal face; and

a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face.

16. The light guide according to claim 15, wherein the line segment corresponding to said emitting face of the light guide

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has a larger width than that of the said line segment connecting the focal points.

17. The light guide according to claim 15, wherein the said line segment connecting the focal points corresponds to a bottom face of the light guide extending longitudinally thereof, is disposed opposite to said line segment corresponding to said emitting face, and has a scattering pattern formed thereon.

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numeral 66 denotes a plastic case. This line illuminator 60, as it has no reflective face in the refractive index medium, serves to restrain the angle of expansion. Thus, since the contents of the compound parabolic reflectors 63 and 64 are air, lights do not expand when they are emitted from the opening 65, which is the outlet of illuminating lights.

Although there have been described what are the present exemplary embodiments of the invention, it will be understood that variations and modifications may be made thereto within the spirit and scope of the appended claims.

The invention claimed is:

1. An elongate light guide having an end face on a longitudinal end thereof, an elongate emitting face extending longitudinally of the guide and an internal face extending longitudinally of the guide, the light guide emits lights incident on the end face from the emitting face in a line shape, while the lights are reflected by the internal face, wherein a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face.

2. The light guide according to claim 1, wherein a side face of the light guide on a side of said emitting face is substantially parallel to the optical axis.

3. The light guide according to claim 1, wherein the sectional shape of the light guide causes light emitted from the emitting face to be confined to a prescribed emission angle with respect to the emitting face.

4. The light guide according to claim 1, wherein the said line segment connecting the focal points corresponds to a bottom face of the light guide extending longitudinally thereof, is disposed opposite to said line segment corresponding to said emitting face, and has a scattering pattern formed thereon.

5. The light guide according to claim 1, wherein said end face is adapted to receive incident light thereon from a light source.

6. The light guide according to claim 1, wherein the line segment corresponding to said emitting face of the light guide has a larger width than that of the said line segment connecting the focal points.

7. An image reader comprising an illuminating unit including: an elongate light guide having an end face on a longitudinal end thereof, an elongate emitting face extending longitudinally of the guide and an internal face extending longitudinally of the guide, the light guide emits lights incident on the end face from the emitting face in a line shape, while the lights are reflected by the internal face, wherein a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face, a light source on an end face of the light guide, a lens array for converging on a light receiving element lights radiated from the illuminating unit toward a document and reflected by the document or transmitted by the document, and a box housing the illuminating unit and the lens array.

8. The image reader according to claim 7, including two of said illuminating units, and the illuminating units are so arranged as to cause lights emitted from the emitting faces of the light guides thereof to irradiate the same area of a face of the document being illuminated.

9. An image reader comprising an illuminating unit including: an elongate light guide having an end face on a longitudinal end thereof, an elongate emitting face extending longitudinally of the guide and an internal face extending longitudinally of the guide, the light guide emits lights incident on the end face from the emitting face in a line shape, while the lights are reflected by the internal face, wherein a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face, and a light source on an end face of the light guide, a lens array for converging on a light receiving element lights radiated from the illuminating unit toward a document and reflected by the document or transmitted by the document, and a box housing the illuminating unit and the lens array, wherein a side face of the light guide on a side of said emitting face is substantially parallel to the optical axis.

10. The image reader according to claim 9, including two of said illuminating units, and the illuminating units are so arranged as to cause lights emitted from the emitting faces of the light guides thereof to irradiate the same area of a face of the document being illuminated.

11. An elongate light guide comprising:

an end face;  
an emitting face extending longitudinally of the guide and which emits light in a line shape; and  
an internal face;  
wherein:

the light guide emits light incident on the end face from the emitting face while the light is reflected by the internal face;

the light emitted from the emitting face is confined to a prescribed emission angle with respect to the emitting face;

a sectional shape of the light guide in a direction orthogonal to the longitudinal direction of this light guide has two opposite parabolas or two oval curves, a line segment connecting the focal points of said two opposite parabolas or the focal points of said two oval curves, and a line segment corresponding to said emitting face; and

said line segment connecting the focal points is disposed opposite to said line segment corresponding to said emitting face and has a scattering pattern formed thereon.

12. The light guide according to claim 11, wherein a side face of the light guide on a side of said emitting face is substantially parallel to an optical axis of the light guide.

13. The light guide according to claim 11, wherein said end face is adapted to receive incident light thereon from a light source.

14. The light guide according to claim 11, wherein the line segment corresponding to said emitting face of the light guide has a larger width than that of the said line segment connecting the focal points.

15. An elongate light guide comprising:

an end face;  
an emitting face extending longitudinally of the guide and which emits light in a line shape; and  
an internal face;  
wherein:

said end face is adapted to receive incident light from a light source;

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UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION

Page 1 of 1

PATENT NO. : 7,529,445 B2  
APPLICATION NO.: 10/562,336  
ISSUE DATE : 05 May 2009  
INVENTOR(S) : Ikeda et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page:

In item (54), correct the title from "LIGHT GUIDE AND LINE ILLUMINATOR" to --LIGHT GUIDE AND IMAGE READER--.

After "*Primary Examiner*—" change "John A Ward" to --John A. Ward--.

In item (73), "Assignee:", change "Ltd, Osaka" to --Ltd., Osaka--.

Column 1:

Line 1, change "LIGHT GUIDE AND LINE ILLUMINATOR" to --LIGHT GUIDE AND IMAGE READER--.

Column 2:

Line 10, change "instance, of illuminating" to --instance, illuminating--.

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